

REMARKS

Claims 13-15 have been amended and remain pending. Reconsideration and withdrawal of all outstanding rejections are requested in light of the foregoing amendments and the following remarks.

Claims 13-15 stand rejected under 35 U.S.C. § 102(b) as being anticipated by JP 2000-329885 to Yamada et al. (“Yamada”).

It is an essential feature of the present invention and recited in each of independent claims 13, 14, and 15 that a tip or edge of the sheath is fixed to a surface (tie rod, handle, and lower support member, respectively) by a laser welding which is performed with the tip of the sheath being fitted onto the respective surfaces as to prevent direct irradiation on the sheath. For example, claim 13 recites the laser welding uses a YAG or CO₂ laser beam set in such a manner that an axial center position of the beam is shifted from an end face position of the step of the tie rod toward an axis center of the tie rod. Accordingly, each of the sheaths being fitted onto the tie rod is welded to the tie rod so that heat is transferred from the surface of the tie rod to the sheath. (Specification, p. 4, lines 16 to p. 5, line 8). Thus, it is the structure of the tie rod that permits direct irradiation, and prevents direct irradiation on the sheath, which has negative implications discussed in more detail below. The welds of the sheath and the handle (claim 14), and the sheath and the lower part support member or the velocity limiter (claim 15) are the same as the weld of the sheath and the tie rod.

Yamada, on the other hand, discloses a welded sheath to a frame configured such that YAG lasers are shifted within a range of 0.1-2.0 mm from a beveling as shown in FIG. 3(b) in order to ensure a reverse side bead. That is, the axial center position of the YAG laser beam irradiates a surface of the sheath in position shifted within a range of 0.1-2.0 mm from the beveling. (See Yamada translation, paragraph 49). As explained in Applicant’s specification, the 0.1-2.0 mm range disclosed by Yamada creates problems in the manufacturing process:

Specifically, since a width of the step at the tip of each of the arms of the tie rod is typically about .5 mm, an overlap of the step of the tie rod with the tip of the sheath is about .5 mm. Therefore, if an error occurs in the axial center position of the laser beam and the laser beam is deviated from the very narrow overlap portion, the sheath is heated to melt down due to a slow heat transfer of the laser beam to the tie rod, to thereby cause a welding failure. (p. 2, lines 17-25).

Further, Yamada discloses that the weld of the sheath and tie rod is the same as the weld of the sheath and the frame.

Yamada does not disclose or even suggest that a surface of the frame is irradiated with the axial center position of the YAG laser beam in position shifted from an end face position of the step of the tie rod toward the frame, as recited by claims 13-15. In fact, if the welding layout of the present invention were applied to Yamada, the axial center position of the YAG laser beam irradiates a surface of the frame in position shifted from the beveling toward the frame. Thus, Yamada does not teach the unique features of the present invention. For at least these reasons, reconsideration and withdrawal of the rejections are respectfully requested.

Claims 13-15 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,028,906 to Kawashima et al ("Kawashima") in view of U.S. Patent No. 6,647,082 to Yamada et al. ("Yamada '082").

Kawashima discloses a control rod configuration such that a tie rod is attached at its upper end with a handle and at its lower end with a lower support member or velocity limiter, also having a U-like sheath attached thereto. Kawashima does not disclose or suggest a tie rod (or any part thereof) that prevents the direct irradiation of a laser beam onto the sheath, as in the present invention.

Yamada '082 discloses a control rod used in a boiling water nuclear reactor, in which four sheaths are attached to a tie rod so as to obtain a cruciform control rod and in which insertion piece 8 is welded to the sheath by a YAG laser beam directly irradiated to

the sheath as shown in FIG. 6A, 6D, 6F, and 7B. Thus, Yamada '082 does not disclose or suggest the essential feature of the present invention as explained above. Simply, Yamada '082 does not disclose a structure that prevents the laser beam from directly irradiating on the sheath.

Accordingly, neither Kawashima nor Yamada '082, whether considered alone or in combination, teach or suggest all of the limitations recited by claims 13-15. Withdrawal of the rejection of these claims is respectfully requested.

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to pass this application to issue.

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Respectfully submitted,

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